Addressing the Tri-Cities Dioxin/Furan Situation

The Dow Chemical Company (Dow) and the Michigan Department of Environmental Quality (MDEQ) are moving forward to resolve dioxin/furan contamination in the tri-cities area and other off-site corrective action obligations.

Dow and the MDEQ agreed to the January 2005 Framework for an Agreement (Framework), in part, for implementation of Dow's off-site corrective action responsibilities as contained in Dow's Hazardous Waste Management Facility Operating License (License), and to propose creating a process that will integrate the resolution of other potential governmental claims with Dow's corrective action obligations. This Framework does not alter any of the requirements contained within Dow's License. It should, however, speed the pace of resolving the situation by concurrently addressing all federal matters along with the State matters governed by the License. The goal is to resolve all known issues with finality so that the tri-cities communities, the State and Dow do not need to readdress these issues in the future.

Interim Response Activities

As required by the MDEQ, Dow is implementing interim response activities (IRAs) to minimize potential contact with soil on residential properties, that may exceed the Agency for Toxic Substances and Disease Registry 1,000 ppt dioxin/furan action guideline, along the Tittabawassee River and in the City of Midland.

In this situation, the IRAs that are being implemented are immediate actions to reduce potential exposure to dioxins and furans through contact with contaminated soil and sediment and consumption of local fish and wild game.

Priority 1 properties (residential properties where IRAs are occurring during 2005) were identified by Dow and the MDEQ in Midland and along the Tittabawassee River. In Midland, properties in three neighborhoods that are close to and downwind of the Dow facility were identified as Priority 1 based on existing dioxin/furan data. Along the Tittabawassee River, Priority 1 properties were generally identified as those properties where floodwaters came within 20 feet of the residence during the 7-10 year flood event in March 2004. Other properties that flooded less extensively were identified as Priority 2 and will be addressed in 2006.

Other IRAs include work done at parks along the river to reduce potential soil contact and fish and wild game consumption, and funding for the development and distribution of signs and informational materials. Additional IRAs may be deemed appropriate anytime during the corrective action process before the implementation of a final remedy. It is also possible for Dow to propose and for MDEQ to approve, at any time, presumptive final remedies.

Residential IRAs

IRAs are currently underway and have been offered for 103 Priority 1 properties in Midland (Corning Lane, areas north and east of the Dow plant) and for 351 Priority 1 properties in the Tittabawassee River Floodplain. Participation in the IRAs is voluntary and at no cost to residents. Each property is evaluated on an individual basis and is offered the following services:

Interior house cleaning of surfaces where dust may accumulate, including carpet, ductwork
Replacement of furnace filters
Installation of cover materials for exposed or poorly covered areas
Other reasonable measures agreed to by residents and Dow

As of August 1, 2005, participation rates (includes all who have agreed to a site visit and have discussed the need for possible interim actions) are at 50% of eligible properties in the floodplain and 64% in Midland.

Park IRAs

IRAs are underway at area parks. Activities at each park reduce potential exposure to soil and sediment and provide fish advisory education via signs that will be placed later this summer. Flood response in the form of sediment removal and disposal is also available at the request of park officials. Scheduled for completion in 2005, IRAs include the following projects, among other enhancements as agreed to by park officials.

Freeland Festival Park

- Installation of portable hand wash stations.
- Installation of six inches of soil and reestablishment of grass cover over developed park area.
- Installation of a wall between park and river in developed park area to direct access to river to selected areas.
- Construction of a handicap-accessible two-tier deck along the shoreline.
- Advisory signs.

Imerman Park

- Installation of portable hand wash stations.
- Stabilization of bank along pavilion.
- Construction of floating dock for fishing.
- Construction of a handicap fishing platform along the river.
- Asphalt/concrete walking path to fishing platform, pavilion and handicap fishing platform.

- Relocation of dog park from lower park near river to higher ground near front of park.
- Installation of concrete pad for use as staging area for cross country track meets.
- Paving of lower parking lot.
- Advisory signs.

West Michigan Park

- Hand wash stations.
- Replacement of sand in play area.
- Gravel cover over walking path down to river from parking lot.
- Advisory signs.

Community Information Centers

Publications are available from the Michigan Department of Community Health (MDCH), Michigan Department of Environmental Quality (MDEQ), Michigan Department of Agriculture (MDA), Agency for Toxic Substances and Disease Registry (ATSDR) at local tri-cities libraries and township halls.

Available Information

Dioxins Fact Sheet
Food, Farming and Gardening Guidelines for Minimizing Dioxin Exposure
Public Health Statement for Chlorinated Dibenzo-p-dioxins (CDDs)
2003 Michigan Family Fish Consumption Guide: Important Facts to Know If You Eat Michigan Fish
Soil Movement Advisory for Private, Public, and Commercial Projects
Toxicological Profile for Chlorinated Dibenzo-p-dioxins (CDDs) – FAQs Sheet
Supplemental Advisory Regarding Part 201 Requirements Applicable to Property Contaminated by Dioxin

Locations

James Township Hall – 6060 Swan Creek Rd. (Saginaw)
Thomas Township Library – 8207 Shields Dr. (Saginaw)
Grace A. Dow Memorial Library – 1710 W. St. Andrews Rd (Midland)
Zauel Memorial Library (Saginaw Township Library) – 3100 N. Center Rd. (Saginaw)
Hoyt Library – 505 Janes St. (Saginaw)
Tittabawassee Township Hall – 145 S. Second St. (Freeland)

Remedial Investigation Work Plans

By the end of this year, Dow is required to supply MDEQ with Remedial Investigation Work Plans (RI Work Plan) for the City of Midland, the Tittabawassee River, and the Upper Saginaw River. The RI Work Plan will be prepared based on a review of the data sources listed below and the State and Federal requirements for conducting an RI. The RI Work Plan will propose further investigation and studies to determine the nature and extent of contamination as well as information that will support the development of a Feasibility Study to design appropriate response actions.

Natural Resource Damages and CERCLA

To reach a final resolution of all of the potential off-site issues, it is necessary to address potential Federal and state claims managed by various federal and state agencies that both overlap and potentially go beyond Dow's obligations under the License. This includes potential cleanup and natural resource claims under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and State law. Natural resources broadly include fish, wildlife, land, water and other such resources that, under the applicable statutes, are considered to be held in trust for the public. Trustees are appointed by the State, federal and Tribal governments. The Framework contemplates that there will be a final agreement between Dow, the State and the federal parties that will address the full range of potential governmental claims arising from historic releases, including “reopeners” to assure protection of public health and the environment.

Public Involvement

The public involvement process is intended to inform the tri-cities communities about the resolution process, advise the communities about contemplated actions before they are taken, and receive comment on those contemplated actions.

The following activities are anticipated for involving the community in the corrective action process:

* Providing information about the health and environmental effects of dioxins/furans and reducing exposure.
* Inform the public about the corrective action process, including interim response activities.
* Inform the public about the major studies that will be undertaken.
* Inform the public about the results of the studies.
* When developed, inform the public about the proposed final remedial actions.

* Receive public input throughout the corrective action process, including comment on the proposed final remedial actions.

- ***Proposed Community Advisory Committee***

One option for involving the community, under consideration, is to establish a Community Advisory Committee (CAC) to advise the MDEQ and Dow in relation to public involvement for the corrective action process. As conceived, the CAC would consist of a discrete number of individuals who would collectively represent the broad range of different stakeholders in the tri-cities communities. The CAC would have a defined charter and meetings would be facilitated by a neutral party, be open to the public and include an agenda item allowing public comment. Under the Framework, Dow has agreed to fund a grant so that the CAC could have its own technical consultant. Media would be welcome and meetings would be transcribed by a court reporter. Transcripts would attribute comments to the person making them and be posted on the MDEQ website. The CAC would hold at least four meetings a year and others as necessary so that MDEQ and Dow can update CAC members on the progress of the corrective action process and to solicit advice. The nature of the discussion before the CAC and degree of input would likely vary with the issue.

***Studies and Activities Underway or* Completed**

Independent Studies Funded By Dow

- **Human Exposure Study** (University of Michigan)
  Study to determine whether individuals living in the tri-cities area in homes with elevated levels of dioxin/furan in the soil have higher levels of dioxin/furan in their bodies than other Michigan residents living outside the tri-cities area in similar communities. Results are expected by the end of 2006.Additional information about the study can be found at the following web site: http://www.sph.umich.edu/dioxin/

- **Bioavailability Study** (Exponent and University of Missouri)
  Study intended to determine how much dioxin/furan found in soil is separated from the soil and “available” for absorption into the body by studying laboratory animals, which are fed local soils containing dioxins and furans as a component of their diet. (Pending approval of the study protocol results expected late 2006)

- **Ecological Field Studies (Michigan State University)** (ENTRIX will analyze MSU data and other data to perform the ecological risk assessment, (results of the research released periodically by MSU to Dow and MDEQ)

Comprehensive field studies and evaluations that will provide additional data for assessing the potential impacts of historic releases from Dow on the Tittabawassee River ecosystem.

Studies Conducted for Dow by Contractors

- **Wild Game Sampling Study (Conducted Fall 2003, ENTRIX; results published, July 2004.**
  The wild game sampling was conducted in response to community requests. Deer, turkey and squirrel samples were collected from two locations in the Tittabawassee River area south of Midland, and from a third, control location north of Midland. Tissue samples were analyzed for dioxins and furans, and results were compared to the reference site and to background dioxin/furan levels in the national food supply for the same or similar species. Additional information about the study can be found at the following web site:
  http://www.dow.com/facilities/namerica/michigan/dioxin/scientific/game.htm

- **Non-analytical Sampling Work Plan (Nov 2004, CH2M Hill, work on-going, some preliminary results currently available))**
  Screening work conducted along the Tittabawassee River to establish techniques to determine river dynamics and sediment movement.
  - Installation of clay pads and co-located turf mats to collect sediments from floodplain during flood events
  - Riverbank erosion and sediment bed elevation study to gain better understanding of potential erosion or deposition at selected locations along Tittabawassee River
  - Geochronology and Dendrogeomorphic Pilot Studies (described below)
  - High-flow event automatic sampling to provide data for use in evaluating gradients in water column suspended solids and contaminant concentrations across floodplain during flood conditions.
  - Continuing Monitoring Studies
    - Flow & Solids Monitoring
    - River level sensing
    - Measurement of floodplain deposition

Additional information about the study can be found at the following web site:
http://www.deq.state.mi.us/documents/deq-whm-hw-14-nonanalytical-sap-final-rev-042105-all[1].pdf

- **Tittabawassee River Sediment Dioxin/Furan Concentration Vertical Variability (March 2005, CH2M Hill, results currently available)**

- Preliminary study to identify the characteristics of different sediments and to evaluate the variability of dioxin/furan concentrations within those sediments.

Additional information about the study can be located at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-04-triver-vert-variability-final.pdf

- **Probing and Coring Study for Characterization of Sediment Type and Thickness of Unconsolidated Deposits, Tittabawassee River, (LimnoTech Inc., Nov. 2004, results currently available)**
  - Provide preliminary characterization of the dominant surficial sediment type.
  - Provide preliminary physical characterization of the sediment column in terms of thickness, grain size distribution, bulk density and total organic carbon.

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-dow-probing-and-coring-study-112004.pdf

- **Ecological Risk Assessment Support Sampling (March 2005 - CH2M Hill, results currently available)**
  - Soil and sediment data collected to support Ecological Risk Assessment.

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-10-era-report-complete.pdf

- **Geochronology Pilot Study, Floodplain Soils Tittabawassee River, Michigan (LimnoTech Inc., May 2005, results currently available).**
  - Test feasibility and potential application of method in sediment age dating and better understand its potential use in assisting in establishing the age and net deposition rate of soil in the Tittabawassee River floodplain.

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-07-report-geochron-2005-05-17.pdf

- **Dendrogeomorphic Pilot Study, Tittabawassee River Floodplain, Michigan (LimnoTech Inc., May 2005, results currently available)**

  - Test feasibility and potential application of method in support of vertical dating of Tittabawassee River floodplain soils and estimation of changes in sediment accumulation rates.

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-dow-dendr_final_5_05.pdf

- **Preliminary Flow and Solids Monitoring 2003-2004, Tittabawassee River, Michigan. (LimnoTech Inc., Nov. 2004, results currently available)**
    - Improve the understanding of solids deposition and transport through the Tittabawassee River system.
    - Provide preliminary data supporting an assessment of the stability of river and floodplain sediments.
    - RI Plan Scoping Studies.

  Additional information can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-13-report-flow-solids-final.pdf

- **Tittabawassee River Floodplain Scoping Study Work Plan- (Revised CH2M HILL, July 2005, Preliminary results expected by September 2005.)**
    - Focused investigation to support refinement of the preliminary conceptual site model for the Tittabawassee River.
    - Attempt to determine the geospatial predictability of dioxin and furan distribution in floodplain soil.
    - Make a preliminary assessment of the vertical distribution of dioxins and furans within floodplain soils.
    - The information will be used to support design of RI.

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-09-tittabawassee-river-floodplain-scoping-study-work-plan-may-2005-ch2m-hill.pdf

- **Upper Saginaw River Sediment Scoping Study (CH2M Hill, 2005, results currently available)**
    - Develop an understanding of the thickness of sediments in the stretch of river between the Sixth Street Turning Basin and the confluence with the Tittabawassee and Shiawassee Rivers along with a preliminary survey of dioxin/furan distribution (Sediment Study Area).

  Additional information about the study can be found at the following web site: http://www.deq.state.mi.us/documents/deq-whm-hw-03-upper-sag-report-final.pdf

State of Michigan Studies

- **Ecological Risk Assessment Studies (**Galbraith Environmental Sciences, results currently available)
  Baseline evaluations of the aquatic and screening level evaluation of the terrestrial ecosystems for the Tittabawassee River for potential risks to ecological receptors from contaminant levels measured in soils,

sediments, fish and bird eggs. The purpose of these evaluations was to determine if potential ecological risks from the dioxin and furan contamination may need to be addressed. These evaluations are available at the following web address:

http://www.michigan.gov/deq/0,1607,7-135-3308_21234_9847-43808--,00.html#Ecological_Risk_Assessment

- **MDCH Pilot Exposure Investigation** (MDCH in consultation with ATSDR, results currently available)
  Pilot study of individuals and their property along the Tittabawassee River, who are known to reside on property with elevated levels of dioxins and furans in the soil and to determine whether and how to conduct a comprehensive human exposure study. This study is complete and a report is available for public comment at the following web address:

  http://www.michigan.gov/documents/Dioxin-TittabawasseeRiverEI070805_130692_7.pdf

- **MDEQ Phase I and II Sampling Studies (2000-2002**, MDEQ results currently available)
  Screening sampling conducted along the Tittabawassee, Chippewa and Pine Rivers by the MDEQ to determine whether dioxin/furan contamination exist and, if so, at what levels. The MDEQ conducted this sampling to start determining if contamination discovered in floodplain soils at the confluence of the Tittabawassee River and Saginaw River was widespread. These studies have been completed and information on the results of these studies is available at the following web address:

  http://www.michigan.gov/deq/0,1607,7-135-3308_21234_9847-43808--,00.html#Soil_Contamination

- **MDEQ Baseline Characterization of Saginaw Bay Watershed Sediment Study (2002, results currently available)**
  Baseline concentrations of contaminants, including dioxins and furans in Tittabawassee River sediments and floodplain soils both upstream and downstream of the City of Midland. The purpose of this study was to establish a baseline for future measurements, determine if contaminants are at a level of environmental concern, are a source of ongoing releases to Lake Huron, and to form the basis of a request(s) for corrective action from any regulated facilities within the watershed. A report on this study was completed and is available at the following web address:

  http://www.deq.state.mi.us/documents/deq-rrd-dioxin-FinalReport.pdf

- **Dioxin-Like Toxicity in the Saginaw Bay Watershed (MDEQ 2004, Funded by U.S. Environmental Protection Agency Great Lakes National Program Office Grant)**
  Screening-level sampling of sediments and floodplain soils in and along the Saginaw, Shiawassee, Flint and Cass Rivers and in the Saginaw Bay to evaluate levels of dioxin and related compounds. This study is intended to provide information for decisions on short-term protection of public health and the environment and long-term remediation of the Shiawassee River, Saginaw River and Bay. The expected completion date for a report on this study is March 30, 2006.

U.S. EPA Studies

- **Superfund Innovative Technology Evaluation (SITE) Program - Performance Verification Testing of Monitoring and Measurement Technologies for Dioxin and Dioxin-Like Compounds in Soil and Sediment (U.S. EPA, 2005)**

  Evaluation of five technologies that show promise as simple, cost-effective analytical methods for determination of dioxin levels in soil and sediment. The MDEQ hosted this program and participated by providing many samples from the tri-cities area.